

## Detecting Alzheimer's Disease Research Aims for Earlier Diagnosis

Do you ever forget where you put your car keys or what you were supposed to pick up at the grocery store? You might worry that these memory lapses, or "senior moments," could be an early sign of Alzheimer's disease (AD), an irreversible brain illness. AD is the most common cause of dementia, which involves memory loss, loss of the ability to solve problems, personality changes and behavioral problems severe enough to interfere with normal activities and relationships.

loss appeared in everyday life? Earlier diagnosis would allow researchers to test possible drugs more quickly for better and earlier treatments.

"There are a number of new drugs under development that we hope will interfere with the progression of Alzheimer's," notes Dr. Susan Molchan of the AD Clinical Trials Program at NIH's National Institute on Aging (NIA). "Ultimately, what we want to be able to do is to test and provide medications that can preserve memory for people at risk."

But doctors often can't tell who those people are until the disease has already developed. Several lines of research funded by NIH are now aiming to uncover AD as early in the disease process as possible.

More than 90% of AD cases develop in people older than 65. AD and

dementia, however, are not a normal part of aging.

AD comes about when **nerve cells** in the brain stop working, lose connections with other nerve cells and die. If you picture a brain as a giant network of highways that relay information, it's as if some cars break down and stop working. Even cars that still work eventually get caught in traffic jams so they can't get to their destinations.

The first breakdowns in AD oc-



### Definitions

#### Nerve Cells

Cells that send and receive signals throughout the brain, creating our thoughts, actions and personalities.

cur in those parts of the brain that control memory. As these nerve cells stop working correctly, short-term memory fails and the ability to do familiar tasks can begin to decline. Damage follows in those parts of the brain responsible for language and reasoning. Over time, even more areas become entangled, leading to behavior and personality changes as well as problems with decision-making and thinking. In the end, a person with AD is bedridden and unable to recognize even close family members. It is a slow process, usually lasting 8-10 years or more.

Researchers have discovered some of the key culprits behind AD. Protein fragments called beta-amyloid form clumps in the spaces between the brain's nerve cells. Researchers think these "plaques" may function like road blocks that keep signals from passing between nerve cells. Another protein called tau forms "tangles," masses of twisted protein threads, inside nerve cells. These tangles,

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If you're concerned about changes in what you can and can't remember, a neurologist or other expert in brain function can test you to find out whether these changes are normal or an early sign of AD. However, doctors can only diagnose AD once symptoms develop. For researchers hoping to slow the progression of AD or prevent it altogether, these clinical tests come very late in the game.

What if there were ways to detect AD well before the signs of memory

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[www.alzheimers.org](http://www.alzheimers.org)

[www.ninds.nih.gov/disorders/dementias/dementia.htm](http://www.ninds.nih.gov/disorders/dementias/dementia.htm)

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researchers believe, affect communication between nerve cells and eventually cause the cells to die. As more and more cells die, those brain areas begin to shrink.

No treatment can currently stop AD. However, several medications are available for people in the early and middle stages of the disease

that may keep some symptoms from becoming worse for a limited time.

Researchers believe that potential therapies for AD will prove most effective if used early in the course of the disease, before symptoms become apparent. One way to identify people at risk is to identify **genes** associated with overall AD risk or with particular aspects of the disease, such as the age at which it begins. Four genes have been shown to affect AD development, and scientists estimate there may be several more.

Some tests of memory, problem solving, attention, counting and



## Definitions

### Genes

Stretches of DNA, a substance you inherit from your parents, that define characteristics you inherit like height, eye color and how likely you are to get certain diseases.

language skills can identify people with a higher risk of developing AD. As scientists learn more about changes in the brain during AD, they are developing methods of detecting AD even earlier. Changes in levels of certain key proteins such as beta-amyloid and tau in cerebrospinal fluid (the liquid that bathes the brain and spinal cord), blood or urine may be an early signal that someone has AD.

Another possible approach may be to use advanced imaging techniques. Doctors can now see what parts of the brain are active as a person does a mental task. They can also measure the size of parts of the brain to see if any areas are shrinking over time. The Alzheimer's Disease Neuroimaging Initiative is a major research study sponsored by NIH to determine which brain scans, blood tests and other tests best track AD. Researchers are now looking for volunteers between 55 and 90 years old—with and without memory problems—to participate. See [www.alzheimers.org/ADNI](http://www.alzheimers.org/ADNI) or call 1-800-438-4380 for more information.

As methods to detect AD continue to improve, scientists supported by NIA are also testing a number of treatments to see if they can prevent AD, slow the disease or help reduce its symptoms. If you're interested in participating in any of these studies, see [www.alzheimers.org/trials](http://www.alzheimers.org/trials).

Doctors at specialized centers can now diagnose AD correctly up to 90% of the time. As promising treatments become available, earlier and more accurate diagnosis of AD will give doctors a better chance to treat its symptoms. An earlier diagnosis will also help people with AD and their families discuss plans for the future while the patient is able to play a role in decision making. ■



## Wise Choices

### Risk Factors for Alzheimer's Disease

There's no proven way to prevent Alzheimer's disease (AD), but researchers think certain factors may affect your risk of getting the disease.

- High blood levels of both cholesterol and the amino acid homocysteine may increase your risk of getting AD. Research suggests that you can significantly lower levels of both these compounds by eating a diet rich in green leafy vegetables, low-fat dairy products, citrus fruits and juices, whole wheat bread and beans.
- High blood pressure creates a higher risk for mental decline, one more reason to try to maintain a healthy blood pressure.
- In one study, diabetes was linked to a 65% increased risk of developing AD. If you have prediabetes, act now to prevent diabetes. If you have diabetes, keep it under control. See [www.ndep.nih.gov/](http://www.ndep.nih.gov/) or call 1-800-438-5383 for more information.
- Studies have shown that intellectually stimulating activities may lower your risk of getting AD, so try to keep your mind active by doing things such as listening to the radio, reading newspapers and magazines, playing puzzle games and taking classes. Remaining socially engaged may also help reduce the risk of dementia.
- Research has shown that both physical and mental function can improve with aerobic fitness, so exercise regularly.

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# The Aging Mind

## Learning to Adjust to Natural Changes

As our brains age, we're less likely to think as quickly as we used to or remember things as well. But the knowledge we gain from life experience can sometimes compensate for other changes in our brains as we age. Older professionals, for example, are often better at their jobs than younger ones. Research is now revealing how the brain changes and adapts as we age. These insights are shedding light on real-life challenges, like how to remember things and how to avoid scams.

Dr. Denise C. Park, director of the Roybal Center for Healthy Minds at the University of Illinois, explains that knowledge and experience are protected as you age. "When you're performing a complex task," she says, "your memory may be less efficient, but your knowledge about how to do it may be better." In most real-world experiences, older people already have previous knowledge that they can use to interpret new situations and decide how to respond.

Researchers can design tests that

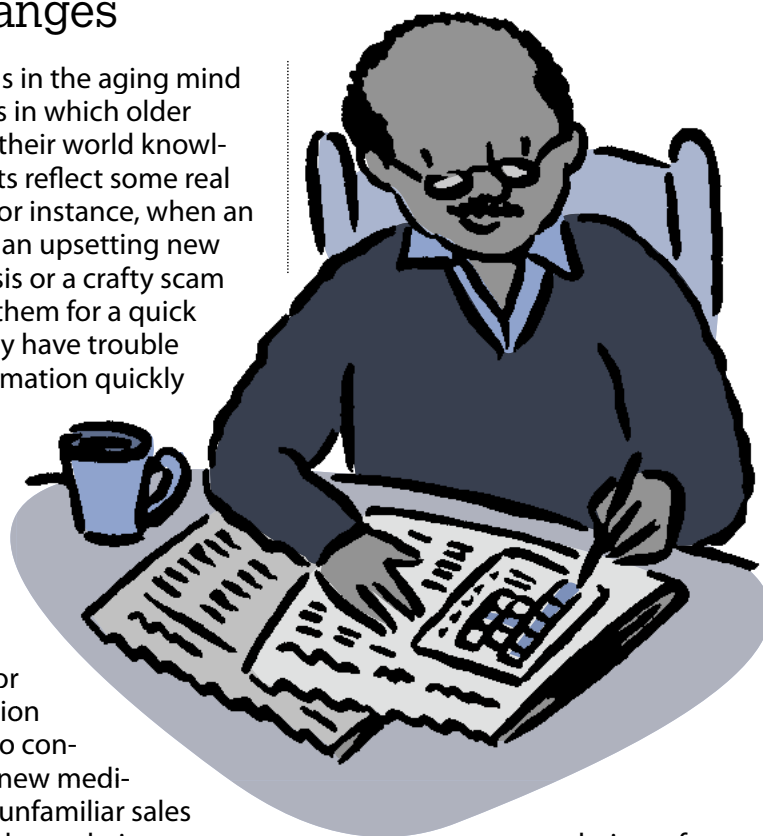
expose problems in the aging mind by creating tasks in which older adults can't use their world knowledge. These tests reflect some real life situations. For instance, when an older adult gets an upsetting new medical diagnosis or a crafty scam artist pressures them for a quick answer, they may have trouble processing information quickly and making a sound decision.

Park says that one key to dealing with situations like these is not to make rash decisions. Ask for further information and more time to consider. Discuss a new medical diagnosis or unfamiliar sales offers with friends or relatives to get more perspective.

Perhaps the most common change people face as they age is trouble remembering things. Park says it's important to acknowledge that your memory is fallible. "For medicines, driving directions or other things with specific details, don't rely on your memory," she says. "That's good advice for everybody, but especially for older adults." If you need to remember something important, write it down on a pad you carry around with you or use an electronic device like a personal digital assistant (PDA) that lets you store notes and reminders.

You can also structure your routines to help you remember things. Try to take a medicine with a snack or a particular meal, for example, and always keep your keys and your wallet in the same place. "Because older adults tend to lead very structured lives, this technique works very well for them," Park says.

Park also advises using your imagination. "If you imagine



completing a future action," she says, "you're much more likely to perform it." For example, imagine taking your medicine in as much detail as you can, paying attention to where, when and how.

Practicing for future events can also help prepare your mind for the real thing. Rehearse your response to a salesperson with a relative or visit somewhere new in advance to make sure you know how to get there.

Some evidence suggests that activities requiring mental effort such as playing board games, reading and playing a musical instrument can help stave off mental decline. Other studies suggest that physical activity might help.

Researchers supported by NIH's National Institute on Aging continue to explore new ways to keep the brain healthy as we age. In the meantime, try to keep in good shape both mentally and physically, and use the tips in this article to help your aging mind keep working as well as it can. ■



### Wise Choices

#### Tips for an Aging Mind

Here are some strategies to help your brain as it changes with age:

- Don't make rash decisions. Give yourself time to think.
- Write things down. Memory can be fallible for people of any age.
- Structure your day and your surroundings to help you remember things.
- Imagine a future action in as much detail as you can.
- Keep your brain active with activities that require mental effort, such as reading.
- Stay physically active.



# Health Capsules

## Treatments for Menopause Symptoms

Many women and their health care providers are considering complementary and alternative medicines (CAM) as a result of potential health problems recent studies have uncovered with prolonged **hormone** therapy, the course of synthetic hormones often used to treat menopausal symptoms. Hot flashes, night

sweats and difficulty sleeping are among the troublesome symptoms that can accompany menopause. In March 2005, NIH gathered an independent panel of health professionals to examine the available treatment options, including CAM therapies, for these symptoms.

The panel reviewed the available research on black cohosh, red clover, dong quai, ginseng, kava, soy and DHEA. They found that there's very little scientific evidence thus far supporting these CAM therapies and concluded that more, better-designed studies are needed to resolve whether they're safe and effective. A number of NIH Institutes and Centers, including the National Center for Complementary and Alternative Medicine (NCCAM), are currently sponsoring many such



### Definitions

#### Hormone

A molecule sent through the bloodstream to signal another part of the body to grow or react a certain way.

#### Placebo

A harmless substitute with no effect, used to compare how well an experimental treatment works.

## Trust and Fear In the Brain

A brain chemical recently found to boost trust reduces activity in the brain's fear hub, the amygdala, according to a new brain imaging study at NIH's National Institute of Mental Health (NIMH). The finding not only provides new insight into emotion and the brain, but also suggests new approaches for treating diseases that involve social fear.

Inspired by Swiss scientists who reported last summer that a **hormone** called oxytocin increased trust in humans, NIMH researcher Dr. Andreas Meyer-Lindenberg and his colleagues set out to explore how this works at the level of brain circuitry. British researchers had earlier linked increased amygdala activity to decreased trust, so Meyer-Lindenberg thought that oxytocin might work by affecting the amygdala.

The researchers asked 15 healthy men to sniff oxytocin or a **placebo**

prior to undergoing a scan that reveals brain activity. While in the scanner, the men performed tasks known to activate the amygdala—matching angry or fearful faces and threatening scenes. The threatening pictures strongly activated the amygdala during the placebo scan, but oxytocin lessened the effect. The difference was especially pronounced in response to threatening faces, suggesting a pivotal role for oxytocin in regulating social fear. Oxytocin also dampened the amygdala's communication with areas in the upper brain-stem that telegraph the fear response to other parts of the body.

This effect of oxytocin suggests possible new approaches for treating diseases thought to involve amygdala dysfunction and social fear, such as social phobia, autism and possibly schizophrenia. ■



[www.nimh.nih.gov/healthinformation/socialphobiamenu.cfm](http://www.nimh.nih.gov/healthinformation/socialphobiamenu.cfm)



[nccam.nih.gov/health/menopauseandcam](http://nccam.nih.gov/health/menopauseandcam)

studies around the country.

The panel did cite three CAM therapies for further study: exercise, paced respiration (or paced breathing, a technique of slow breathing using the stomach muscles) and education about menopause. They noted that these therapies are also relatively safe.

If you're considering or are already using CAM—including over-the-counter supplements such as herbal formulas—talk to your health care provider to make sure the therapy is safe, particularly when combined with other medicines and therapies you might be taking. ■



### Featured Web Site

Eye Disease Simulations

[www.nei.nih.gov/health/examples/index.asp](http://www.nei.nih.gov/health/examples/index.asp)

Eye disease is a major public health problem in the U.S., causing significant suffering, disability, loss of productivity and diminished quality of life for millions of people. See samples of a scene as it might be seen by someone with age-related macular degeneration, a cataract, glaucoma or several other eye diseases. *From NIH's National Eye Institute.*

